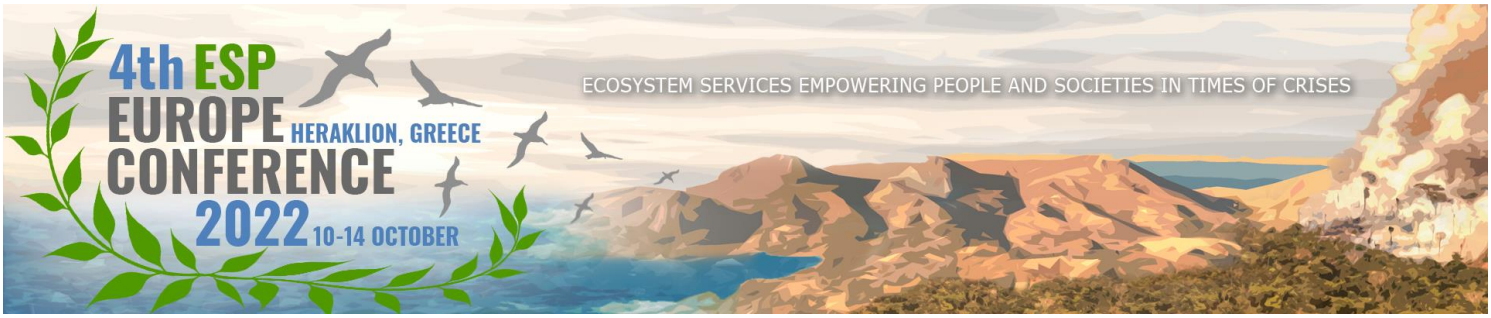


BOOK OF ABSTRACTS

I. SESSION DESCRIPTION

ID: S8d

UNESCO Biosphere Reserves as key areas for new insights into Ecosystem Services assessment, valuation and management

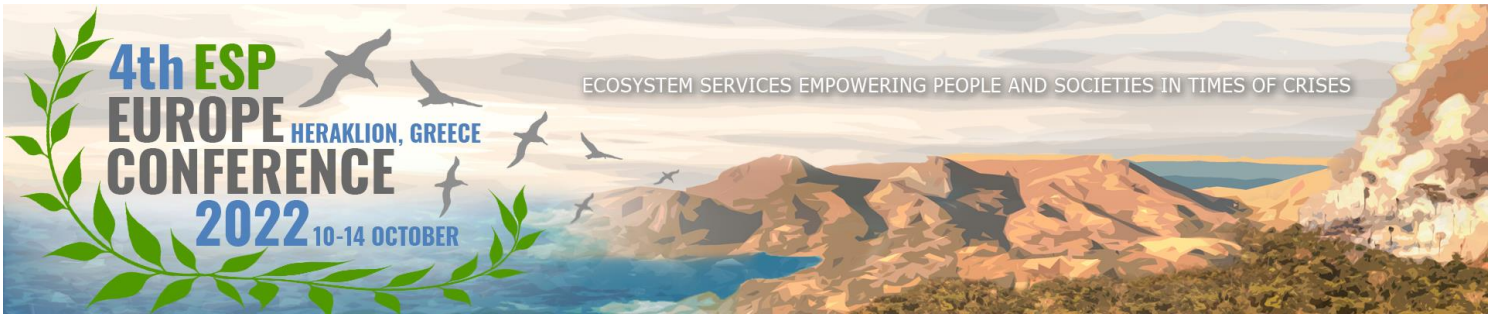
Hosts:

	Title	Name	Organisation	E-mail
Host:	Prof. Dr.	Helena Freitas	Centre for Functional Ecology (CFE), Department of Life Sciences, University of Coimbra, Portugal	hfreitas@uc.pt
Co-host(s):	Prof. Dr.	Inger Måren	Department of Biological Sciences, The University of Bergen, Norway	inger.maaren@uib.no
	Dr.	Joana Alves	Centre for Functional Ecology (CFE), Department of Life Sciences, University of Coimbra, Portugal	jalves@uc.pt
	Dr.	Alicia Barraclough	Department of Biological Sciences, The University of Bergen, Norway	alicia.barraclough@uib.no

Abstract:

"Biosphere Reserves (BRs) are territories recognized by UNESCO's "Man and Biosphere" (MaB) committee for their natural and cultural heritage, emphasizing their role in promoting solutions to conserve biodiversity, restore and enhance ecosystem services (ES), and foster sustainable use and management of natural resources. On a global scale there are in total 727 Biosphere Reserves in 131 countries. These BRs cover 6% of the earth's surface and are home to 225 million people. Furthermore, BRs are identified as "learning places for sustainable development", where society, from the communities to local, regional, or national entities, acts as key-drivers for valuing and developing the territory sustainability. Therefore, the assessment of ecosystem services (ES) plays a fundamental role in the sustainability of the BR's communities and their territories, as well as in the mitigation and adaptation to climate change. With the holistic assessment provided by BRs, encompassing the ecological, economic, and social perspectives of the different ES, these can be defined as model areas to achieve the United Nations Sustainable Development Goals (UNSDG), focused on biodiversity and natural resources as the key providers of ES.

With this session we intend to promote the sharing of experiences and studies regarding BRs as study-cases for ES assessment in all its perspectives, encompassing accounting,



monitoring, mapping, and socio-cultural and monetary valuations. We are keen to receive any ES assessment approach based on the MAES, CICES, NCP, or any innovative methods, with a special interest in ES modelling, particularly including future scenario analysis of land-use shifts or climate change impacts in BRs. We are also interested in works related to accounting and economic valuation of ES, following different approaches such as the SEEA, TEEB or others, implemented in BRs. We are looking forward to receiving proposals that integrate the holistic perspective of the MaB program to define guidelines for the sustainable use of natural resources, nature-based solutions, and adaptation to climate change scenarios in accordance with the UN's Agenda 2030."

Goals and objectives of the session:

- Spotlight the role of biosphere reserves as model areas for sustainable management
- Facilitate knowledge sharing amongst researchers working in, for and with biosphere reserves
- Highlight the role of ES in the sustainable management of biocultural diversity and in adaption to climate change in biosphere reserves
- Help define sustainable management guidelines/frameworks for the mitigation and adaptation to climate change scenarios, based on ES, enhancing the biocultural values of biosphere reserves
- Jointly share and develop strategies for future knowledge-based action in biosphere reserves
- Promote a network opportunity for researchers working on ES in biosphere reserves, enabling the creation of a dedicated sectorial working group"

Planned output / Deliverables:

- Special issue dedicated to ES in Biosphere Reserves
- Elaborate and develop a common protocol to guide holistic ES assessments for BRs
- Formation of a sectoral working group on ES in Biosphere Reserves

Session format:

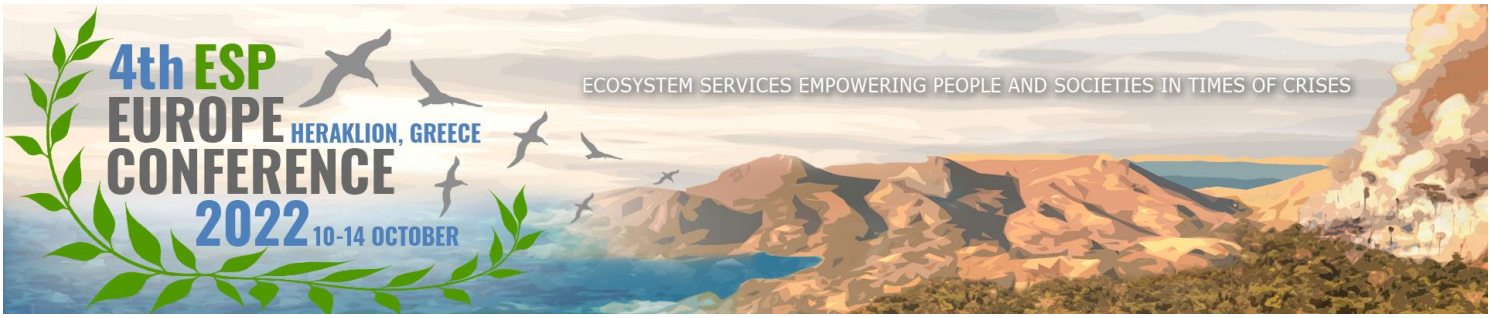
World Café

Voluntary contributions accepted:

Yes, I allow any abstract to be submitted to my session for review

Related to ESP Working Group/National Network:

Sectoral Working Groups: SWG 8 - ES in Conservation



II. SESSION PROGRAM

Date of session: Tuesday, 11 October
Time of session: 11:00 – 12:30; 13:30 – 15:30

Timetable speakers

Time	First name	Surname	Organization	Title of presentation
11:00	Helena	Freitas	Centre for Functional Ecology (CFE), Department of Life Sciences, University of Coimbra	UNESCO Biosphere Reserves as key areas for new insights into Ecosystem Services assessment, valuation and management: the 12 Portuguese BR as case study
11:30	Katja	Malmborg	University of Bergen, Department of Biological Sciences	How on Earth? Exploring the uses of the ecosystem service concept together with a UNESCO biosphere reserve
11:40	Liliana	Solé Figueras	University of Turku	Multiple driver analysis and tourism impacts in Biosphere Reserve areas
11:50	Miguel	Moreira	Centre for Functional Ecology (CFE), Department of Life Sciences, University of Coimbra	Biosphere Reserves: Sustainable territories, Resilient communities – A conceptual model for assessing and mapping ecosystems and their services
12:00	Luciana	Frazão	Centre for Functional Ecology (CFE), Department of Life Sciences, University of Coimbra	Ecosystem services and stakeholders' perception: Which services are a priority in Biosphere Reserves in Portugal and what are their main threats?
12:10	Somaya	Ghoraba	IUCN	The application of the IUCN Red List of Ecosystems (RLE) to assess the conservation status of ecosystems (case study: Burullus protected area)
12:20	Inger	Måren	University of Bergen, Department of Biological Sciences	Discussion – first part

Time	First name	Surname	Organization	Title of presentation
13:30	Marc	Metzger	The University of Edinburgh, School of GeoSciences	Developing a shared vision for sustainable regional land use in the Southern Ayrshire and Galloway Biosphere in Scotland.
13:40	Jarrod	Cusens	University of Bergen, Department of Biological Sciences	Integration matters: Combining socio-cultural and biophysical methods for mapping social-ecological systems in a Nordic Biosphere Reserve
13:50	João	José	University of Trás-os-Montes and Alto Douro	The role of Social Cultural Ecosystem Services: A case study of Scuba Divers in a UNESCO Berlengas Biosphere Natural Reserve
14:10	Joana	Alves	Centre for Functional Ecology (CFE), Department of Life Sciences, University of Coimbra	Discussion – second part
14:20	Inger & Joana	Måren & Alves		World Café
15:20	Helena	Freitas		Final conclusions

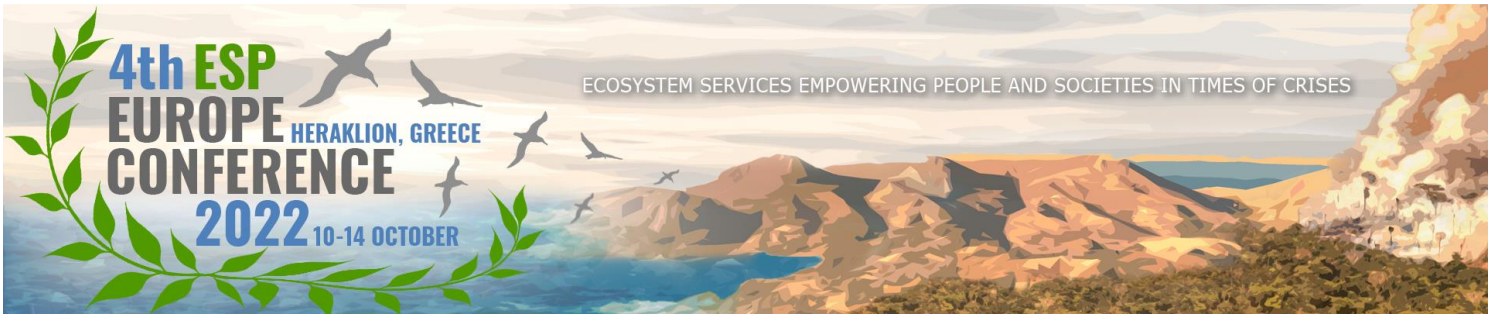
III. ABSTRACTS

Abstracts are ordered based on the session program. The first author is the presenting author unless indicated otherwise.

1. Type of submission: Abstract

S. Sectoral Working Group sessions: S8d – UNESCO Biosphere Reserves as key areas for new insights into Ecosystem Services assessment, valuation and management

The application of the IUCN Red List of Ecosystems (RLE) to assess the conservation status of ecosystems (case study: Burullus protected area)



Presenting author: Somaya Ghoraba

Other author(s): Marwa Halmy, Boshra Salem, Nadia Badr

Affiliation: IUCNEgypt

Contact:som_m85@yahoo.com

Sustaining ecosystems is essential for maintaining nature's contribution to humans and improving the provision of ecosystem services to local communities. Robust and consistent assessment of biosphere reserves is fundamental for achieving sustainable development goals and enhancing the quality of ecosystem services. The International Union for Conservation of Nature (IUCN) has developed the Red List of Ecosystems (RLE) framework that applies standard criteria and categories to assess the conservation status of ecosystems due to environmental changes and human activities. Three different ecosystem types of a national protected area and a potential biosphere reserve were evaluated using the RLE assessment. The assessment provided a clear understanding of the human impact on the assessed ecosystems by producing valuable outcomes, including a complete ecosystem description of the key processes and interactions, an ecosystem diagnostic model, identification of the risk status, and metadata of spatial and ecological variables. The outcomes from the study can improve the livelihood within biosphere reserves and bring added value to further works to establish new biosphere reserves. The study also highlights the need for action to protect threatened ecosystems and their biodiversity to prevent the loss of ecosystem services. Therefore, the outcomes assist policymakers and practitioners in prioritizing investments in sustainable management and restoration. The RLE is considered a long-term, repeatable, impartial monitoring tool for national reporting (SDGs, Aichi targets, climate change).

2. Type of submission: Abstract

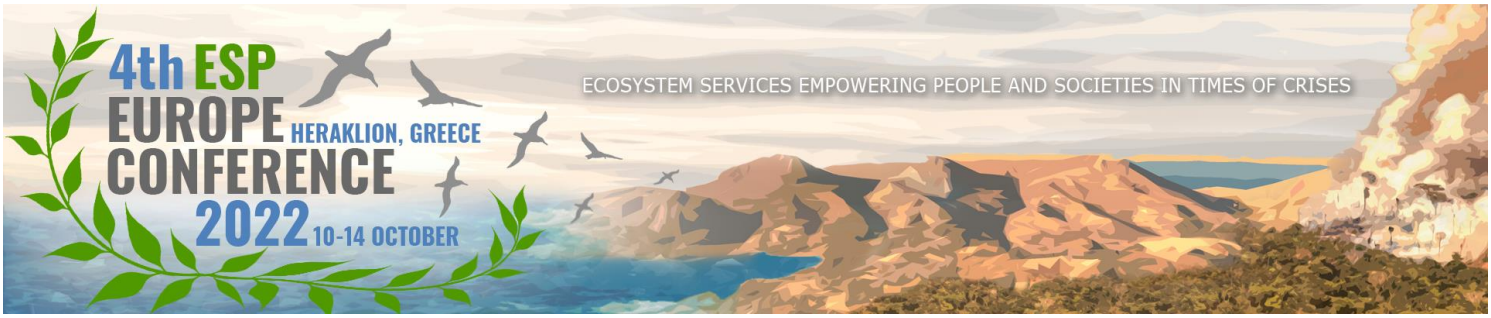
S. Sectoral Working Group sessions: S8d - UNESCO Biosphere Reserves as key areas for new insights into Ecosystem Services assessment, valuation and management

Ecosystem services and stakeholders' perception: Which services are a priority in Biosphere Reserves in Portugal and what are their main threats?

Presenting author: Luciana Frazão

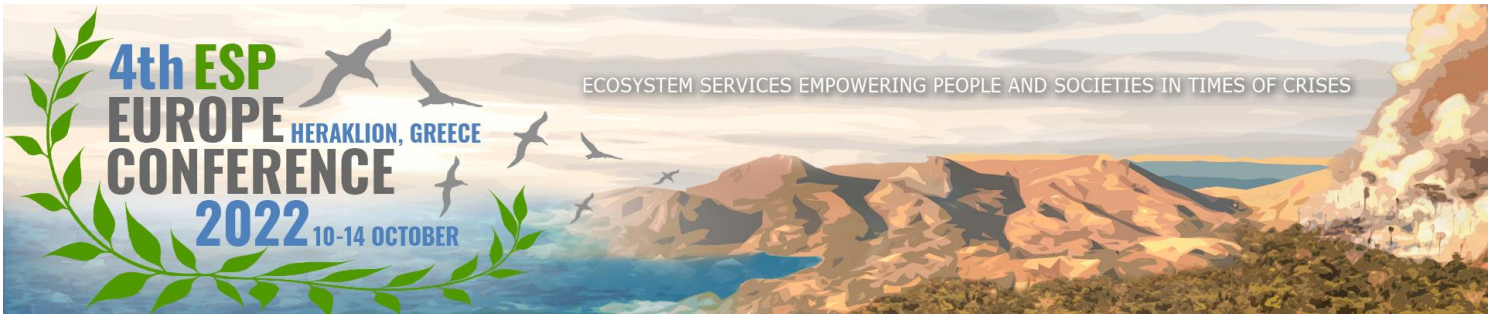
Other author(s): António Gouveia, Miguel Moreira, Paula Castro, Anabela Paula, Maria João Martins, Helena Freitas, Joana Alves

Contact: luca.frazao@uc.pt



Participatory methods can be used to assess the ecosystem services (ES) provided by specific areas and to identify preferences in local communities, supporting the preparation of ecosystem service management strategies and conflict resolution. Participatory discussions are a research method that has been effectively utilized in numerous social science disciplines, either as a standalone method or more often alongside other methods and is a powerful tool for assessing ecosystem services. In this study, we wanted to find out what the most important ecosystem services were in the Portuguese Biosphere Reserves and what the main threats were to these services. We did this by holding a workshop with representatives from each entity in charge of running the RBs. The selected representatives to participate were all people directly involved in Biosphere Reserves, working on management, research, or other activities in the BRs. To identify the key ES, we used a point system method based on the SEs already identified in the Common International Classification of Ecosystem Services (CICES) V5.1. The responses obtained from participants about potential threats regarding priority ecosystem services were analyzed with text mining and the result was plotted on a “word cloud” graph for better visualization. We performed all analyses in the virtual environment RStudio using the NPL, tm, RcolorBrewer, wordcloud2 and rcolors packages. The key ES identified were plants cultivated for nutritional purposes, drinking water, the regulation and maintenance of the biotic environment in the quality of the environment, such as the regulation of water flow and maintenance of the climate, and cultural services that represent education, culture, research and education, and traditional knowledge. Regarding the stakeholders' perception of potential threats, the most mentioned terms were “Climate change”.

Keywords: Assessment, Local knowledge, Participatory methodology, Social perception, Sustainability



3. Type of submission: Abstract

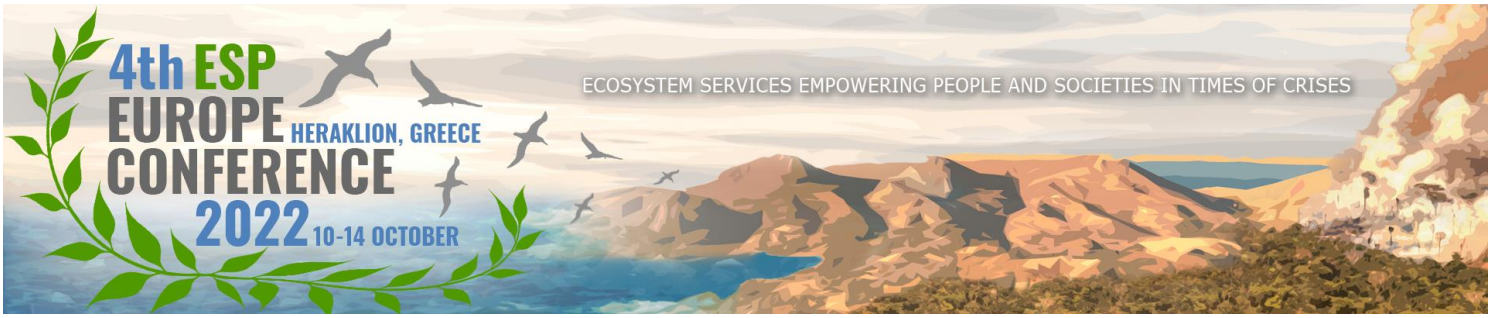
S. Sectoral Working Group sessions: S8d - UNESCO Biosphere Reserves as key areas for new insights into Ecosystem Services assessment, valuation and management

The role of Social Cultural Ecosystem Services: A case study of Scuba Divers in a UNESCO Berlengas Biosphere Natural Reserve

Presenting author: Joao Jose
Other author(s): , , Jorge Campaniço, Yajie Liu, Sebastian Villasante, Edna Cabecinha
Affiliation: University of Trás-os-Montes and Alto Douro, Portugal
Contact:joaojose@utad.pt

Scuba diving is a recreational activity attributed to the biodiversity and healthy ecosystems that a Marine Protected Area (MPA) tends to offer. Scuba diving tourism can also contribute to increased ecological awareness for protecting the marine environment. The United Nations Educational, Scientific and Cultural Organization's (UNESCO's) Biosphere Reserves are essential locations for sustainable tourism and leisure activities. This study explored the profile of scuba divers to analyze their motivations and choices to dive in a UNESCO's MPA, their perceptions of what kind of ecosystem services (ESs) the MPA provides, and how the activity may affect their mental and physical health. In the UNESCO Berlengas Biosphere Reserve (Portugal), we collected 197 questionnaires from divers during the touristic period in the summer of 2021. Of the respondents, 70% presented a university education level, and 63% were certified recreational divers. Our results suggest that the majority of the scuba divers don't participate in other activities, and the main reasons to choose diving in the Berlengas are the biodiversity (59%), the underwater cultural heritage (48%) and the water visibility (45%). In light of the benefits, 52% of divers identified cultural services and 42% regulatory services, while provisioning services were the least important (6%). Most respondents indicated that scuba diving in the reserve has a positive impact on their physical and mental health. Our study also suggests that the MPAs as a management tool can be improved through the capacity building of the importance of marine reserves to conserve biodiversity and ESs.

Keywords: Cultural ecosystem services, Marine protected areas, Scuba diving, UNESCO, Physical and mental health



4. Type of submission: Abstract

S. Sectoral Working Group sessions: S8d - UNESCO Biosphere Reserves as key areas for new insights into Ecosystem Services assessment, valuation and management

Multiple driver analysis and tourism impacts in Biosphere Reserve areas

Presenting author: Liliana Solé Figueras
Other author(s): Nora, Fagerholm,
Affiliation: University of Turku, Finland
Contact:liliana.solefigueras@utu.fi

Scientific research has been studying the continued degradation of coastal ecosystems and their ecosystem services. However, the existing research still fails to integrate the interactions among drivers of coastal change and the effects of these interactions on ecosystems and services. The failure to understand and integrate multiple drivers' relations and impacts can result into misallocation of coastal management and policy instruments aimed to protect coastal areas. This study answers to the above-mentioned knowledge gap by focusing on one core economic activity, tourism, that exerts great pressure in coastal areas. Tourism is one of the fastest growing sectors worldwide, and it is expected to reach pre-pandemic levels by 2023. In recent years, several Biosphere Reserves have become important tourist destinations, especially those in industrialized countries. For this reason, the research is performed at one UNESCO Biosphere Reserves located in Finland that balances between increasing but sustainable tourism. The overall objective of the project is to study the social and ecological complex feedbacks and relations linked to tourism in two Biosphere Reserves areas to provide holistic and interdisciplinary knowledge for future management, mitigation and adaptation to climate change of the study areas, however the implications are valuable more widely for Biosphere Reserves and coastal tourism management. The objective is divided in four subobjectives; i) Identify and assess ecosystem services that underpin tourism activities, ii) Identify and assess drivers, drivers' interactions, and impacts of tourism activities, iii) Identify future management priorities and adaptation strategies. The study integrates socio-ecological network analysis and Public Participation GIS (PPGIS) approaches. During the summer of 2022 (June 2022 to August 2022) PGGIS

campaign is being carried out to identify the ecosystem services that support tourism in the Archipelago Sea (Finland). An online PPGIS survey allowed visitors and locals, randomize sample, to identify main spots and ecosystem services for tourism proposes.

Keywords: Ecosystem services, Biosphere Reserves, tourism, Public Participation GIS, multiple drivers, global change

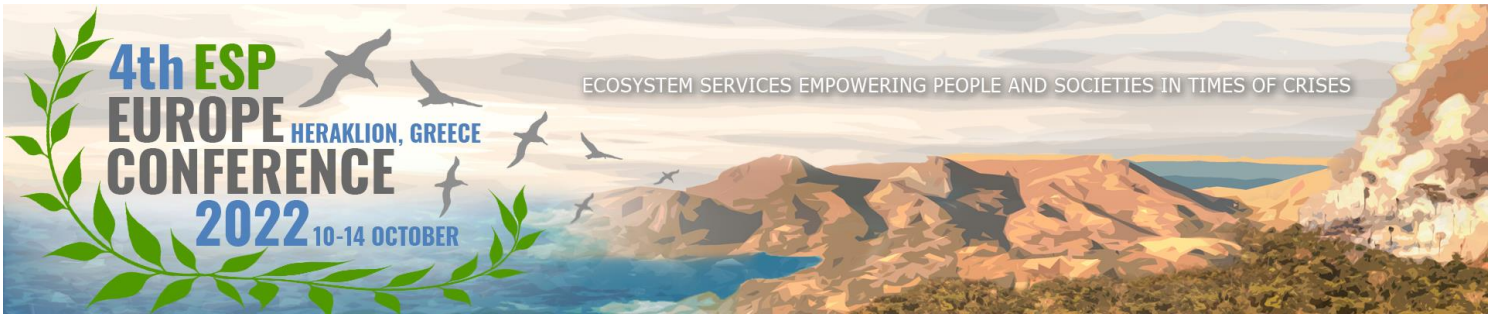
5. Type of submission: Abstract

S. Sectoral Working Group sessions: S8d - UNESCO Biosphere Reserves as key areas for new insights into Ecosystem Services assessment, valuation and management

Governing anthropogenic assets for nature's contributions to people in forests: A policy document analysis

Presenting author: Roman Isaac
Other author(s): Johanna Hofmann, Jana Koegstg, Lene Salia DäflerBerta Martín-López
Affiliation: Leuphana University Lüneburg, Germany
Contact:isaac@leuphana.de

Nature's contributions to people (NCP) are derived from an interplay of both natural and anthropogenic assets, which is a process known as NCP co-production. Like nature and NCP, anthropogenic assets are subject to modes of governance operating across multiple levels. Policies are one way of executing formal governance. Here we conduct a document analysis to investigate how policies refer to both the anthropogenic assets involved in NCP co-production and the modes of governance affecting these. Our policy document analysis (PDA) focuses on forestry and biodiversity conservation policies spanning across multiple governance levels from the local case study level – two Biosphere Reserves and one National Park in Germany – to the supra-national level of the European Union. To analyse different governance modes, we follow the classification described by Primmer et al. (2015) who differentiate between hierarchical, scientific-technical, (adaptive)-collaborative governance and the governing of strategic behaviour. Our preliminary results show that policies mostly address material and regulating NCP as well as hierarchical and scientific-technical governance. Based on a redundancy analysis we identify six combinations of NCP, anthropogenic assets and modes of governance executed at different governance levels that highlight how governance affects the use of anthropogenic assets in the co-production of material, regulating and non-material NCP in forests.



Keywords: ecosystem services, co-production, governance, systematic review

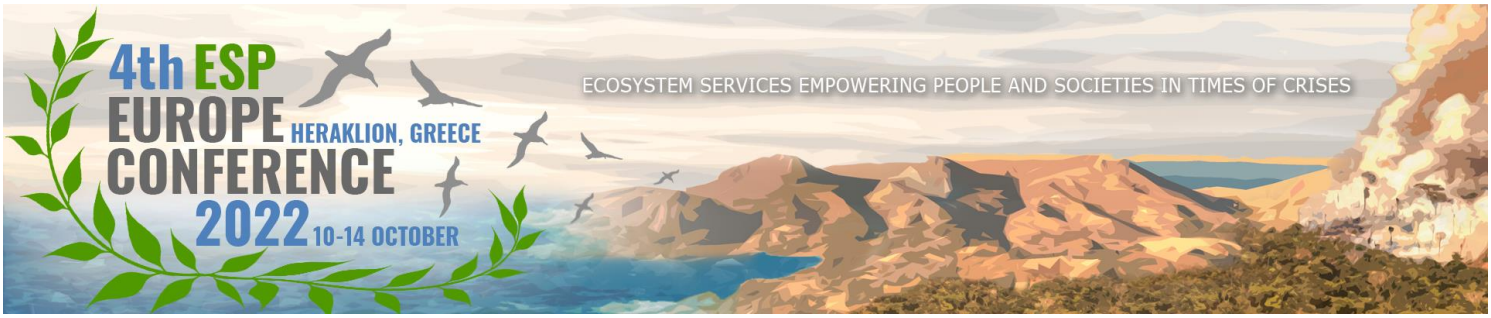
6. Type of submission: Abstract

S. Sectoral Working Group sessions: S8d - UNESCO Biosphere Reserves as key areas for new insights into Ecosystem Services assessment, valuation and management

Developing a shared vision for sustainable regional land use in the Southern Ayrshire and Galloway Biosphere in Scotland.

Presenting author: Marc Metzger
Other author(s): Darren Moseley, Louise Sing, Anastasia YangEd Forrest
Affiliation: The University fo Edinburgh, United Kingdom
Contact:marc.metzger@ed.ac.uk

Climate change and evolving societal demands emphasise the need to manage our landscapes to be more resilient and adaptable, and the importance of restoring and improving our ecosystems. However, getting agreement on which elements of the landscapes should or shouldn't change can be difficult as conflicting views and tensions may arise if people feel that their voices have not been heard. We tested a visioning approach in the Galloway and Southern Ayrshire Biosphere. Located in in South West Scotland, the Biosphere aims to promote a more sustainable, balanced and sustainable use of the natural, cultural and social assets of the region. The Biosphere comprises of a mix of landscapes highly valued for their cultural and ecological importance, alongside large areas of productive conifer plantations and intensive dairy farming. Through a collaborative process with a diverse group of stakeholders we identified a shared vision that combined social, economic and environmental aspirations. The future vision is for a varied, mixed and integrated living and working landscape that provides an excellent place to live and work with a strong identity and a respected and celebrated natural and cultural heritage. The vision narrative was used to develop spatial criteria to identify where changes in land use of land management could potentially take place, e.g., improving habitat quality by planting trees alongside riparian areas and close to communities or restoring peatlands. Maps identifying the areas of potential land use change were shared and discussed with stakeholders at the Biosphere and landscape scale to support discussions on how and where land use and land management should change in the Biosphere to achieve the vision. Despite challenges due to COVID-19, the approach worked well and could be replicated to



develop regional land use visions elsewhere to support land use planning and reconcile tentions over competing land use.

Keywords: visions, land use change, rural development, ecosystem restoration, decision support

7. Type of submission: Abstract

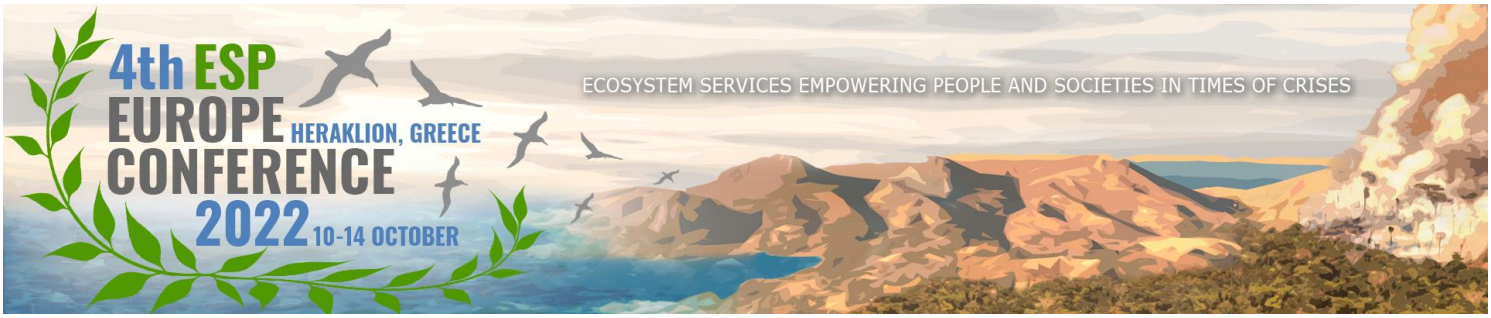
S. Sectoral Working Group sessions: S8d - UNESCO Biosphere Reserves as key areas for new insights into Ecosystem Services assessment, valuation and management

Integration matters: Combining socio-cultural and biophysical methods for mapping social-ecological systems in a Nordic Biosphere Reserve

Presenting author: Jarrod Cusens
Other author(s): Alicia D. Barraclough, Inger E. Måren,
Affiliation: University of BergenNorway
Contact:jarrod.cusens@uib.no

Ecosystem services can play an important role in sustainable landscape management. The way that people value ecosystem services is diverse encompassing social and ecological domains and there is a need to bring these different values together. We used social-cultural and biophysical methods to map a diverse set of ecosystem services developed with local stakeholders in a Biosphere Reserve in Norway, a succinct case study region for exploring ecosystem service assessment in a social-ecological landscape. The mapped ecosystem services bundled into three distinct social-ecological systems archetypes across two spatial scales which were well matched to relative ecosystem services values of the Biosphere Reserve zones. We argue that it is important to consider the social-ecological context of the zones in addition to their identity to provide sufficient knowledge to inform management. Our work has the capacity to strengthen relationships and contribute to sustainable land management that takes biocultural diversity into consideration.

Keywords: biocultural diversity, Biosphere Reserve zonation, ecosystem service bundles, socio-cultural values, UNESCO Biosphere Reserves



8. Type of submission: Abstract

S. Sectoral Working Group sessions: S8d – UNESCO Biosphere Reserves as key areas for new insights into Ecosystem Services assessment, valuation and management

How on Earth? Exploring the uses of the ecosystem service concept together with a UNESCO biosphere reserve

Presenting author: Katja Malmborg

Affiliation: University of BergenNorway

Contact:katja.malmborg@uib.no

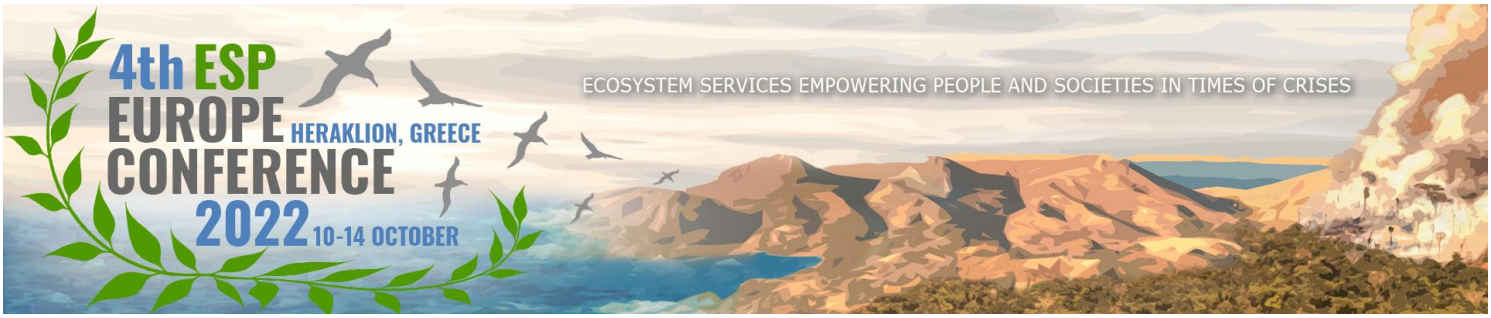
The ecosystem service concept has risen in prominence over the last decades as a tool to support sustainable landscape management. In my research, I have explored how the ecosystem service concept can be used as a tool to support the sustainable practices of various local actors who are engaging in landscape management. The core of my research was a 4-year participatory ecosystem service and resilience assessment process conducted together with a diverse group of actors in the Kristianstad Vattenrike UNESCO Biosphere Reserve in Southern Sweden. This process resulted in three papers, all focusing on different aspects of the participatory ecosystem service bundles analysis, learning about resilience and the practices of knowledge co-production. I will present insights from these three papers about the use of the ecosystem service concept and also reflect on how my collaboration with a biosphere reserve gave invaluable support to this transdisciplinary research.

Keywords: Ecosystem service bundles, Resilience thinking, Knowledge co-production, Process evaluation, Biosphere reserve

9. Type of submission: Abstract

S. Sectoral Working Group sessions: S8d – UNESCO Biosphere Reserves as key areas for new insights into Ecosystem Services assessment, valuation and management

Biosphere Reserves: Sustainable territories, Resilient communities – A conceptual model for assessing and mapping ecosystems and their services



Presenting author: Miguel Moreira

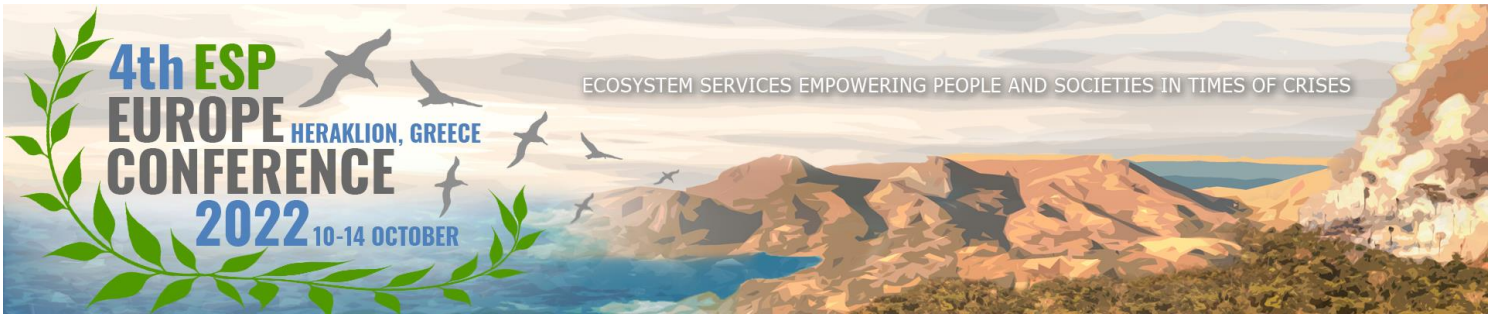
Other author(s): Miguel Moreira, Luciana Frazão, António Alves da SilvaAntónio GouveiaJosé Paulo SousaPaula CastroFilipe Martinho

Affiliation: Centre for Functional Ecology – Science for People and the Planet (CFE), TERRA Associate LaboratoryPortugal

Contact:mmoreira@uc.pt

Biosphere Reserves (BR) are territories recognized by UNESCO for their natural and cultural heritage and for their role in harmonizing biodiversity conservation with the sustainable use of natural resources. Further, BRs are identified as “learning places for sustainable development”, emphasizing their importance in achieving the UN Sustainable Development Goals. However, Portuguese BRs lack recognition from society as well as from the local, regional, or national entities as privileged areas for valuing and developing the territory. To enhance the relevance and visibility of the BRs in society and among stakeholders, we designed a project based on the assessment of ecosystem services (ES), as they play a fundamental role in the mitigation and adaptation to climate change and the sustainability of the communities and their territories. Our project seeks to structure and foster collective dynamics in these social-ecological systems, respecting the autonomy and diversity of context and heritage that characterize the Portuguese BRs. Our work is based on a conceptual model with three fundamental pillars. First, we identified available geographical and biological information and combined it with remote sensing data to map the current and potential ES provided by Portuguese BRs. Second, in each BR, we will implement participatory multi-actor methodologies and focal groups to select the key ES to promote sustainable development and valorization of natural endogenous resources. Lastly, we will capacitate local stakeholders on how to value, market, and use ES in a way that is sustainable. We will also help these communities put the Sustainable Development Plans of each BR into action. Through complementary initiatives and a comprehensive and networked programmatic action, “Biosphere Reserves: Sustainable territories, Resilient communities” seeks to add value to Portuguese BRs, increasing their resilience and sustainability, and to promote their unique territories and heritage, while showcasing them as model areas for sustainable development.

Keywords: Sustainable development, Ecosystem services governance, Land-use management, UNESCO Biosphere Reserves



10. Type of submission: Abstract

S. Sectoral Working Group sessions: S8d - UNESCO Biosphere Reserves as key areas for new insights into Ecosystem Services assessment, valuation and management

Assessing forest multifunctionality: an ecosystem services approach to forest ecosystems in Portugal

Presenting author: Joana Alves

Other authors: Joana Alves1, Fernanda Follmann1, Paula Castro1, António Alves da Silva1, Catarina Coelho1, Hélder Viana2, Celeste Santos-Silva3, Sílvia Castro1, João Loureiro1, Cristina Canhoto1, Ana Gonçalves1, Cristina Amaro da Costa2, Fátima Alves1,4, Helena Freitas1, José Paulo Sousa1

Affiliation: 1Centre for Functional Ecology - Science for People and the Planet (CFE), TERRA Associate Laboratory, Department of Life Sciences, University of Coimbra, Portugal

2Centre for the Research and Technology of Agro-Environmental and Biological Sciences, Viseu Agricultural Superior School, Viseu Polytechnic Institute of, Portugal.

3Biology Department, Macromycology Laboratory, MED - Mediterranean Institute for Agriculture, Environment and Development, University of Évora, Évora, Portugal.

4Open University, Portugal.

The multifunctional nature of forest ecosystems has acquired great relevance, making it necessary to have a holistic approach to the forest that allows an integrated management of natural resources in a broad territorial and multi-actor perspective. However, unsustainable management practices have compromised the multifunctionality of forests, resulting not only in the loss of biodiversity and habitat degradation but also in the loss of financial income associated with forest products and services. Forests provide a rich and diverse set of services and associated products, not all with market value but highly important to human well-being.

This study focuses on assessing the multifunctional potential of forests in Portugal in terms of the valuation of ecosystem goods and services. Achieving the proposed objectives implies the development of a methodological approach capable of evaluating the potential of providing ecosystem services (ES) at a regional and local scale. The assessment of key ES provision potential of each of the identified ecosystem types followed a matrix approach, based on the analysis of specific indicators (MAES Tier 2) and validated by experts, combined with the current condition of ecosystems. The spatially explicit modeling of ES provision

potential at the local level was carried out in a GIS environment, and for which it was considered that the current provision potential results from the potential provision through the matrix evaluation, combined with the ecosystem condition.

The results obtained show the global importance of these ecosystems and the multifunctional character of forests. However, it was also evident from the results that biodiverse forests provide more and better ecosystem services. So, the territorial strategy should involve changing some monoculture forest areas into mixed forest areas, which have a wider range of uses and greater economic profitability through the exploitation of forest by-products, thus contributing to the sustainability of forest ecosystems.

Keywords:

Ecosystem services assessment, Forest ecosystems, Multifunctionality, Non-wood products, Sustainability

Acknowledgements:

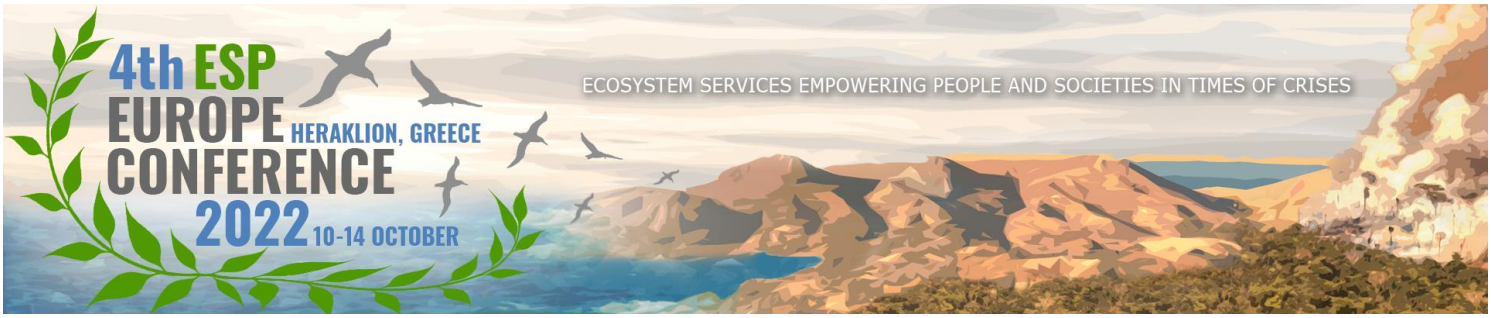
This work was carried out under the project MultiForest – "Forest Multifunctionality: The potential and valorisation of the goods and services of the forest ecosystems in Portugal (PDR2020-2023-045931)", co-financed by the PDR 2020, Portugal 2020, and the European Union, through the European Agricultural Fund for Rural Development (EAFRD) and "F4F – Forest for Future – Pilot project for the constitution of a regional network for the valorisation of the forest sector in the Central Region PP6 – MyFORESt (CENTRO-08-5864-FSE-000031)", co-financed by the Regional Operational Programme Centro 2020, Portugal 2020, and the European Union, through the European Social Fund (ESF). The work was also supported by the R&D Unit Centre for Functional Ecology – Science for People and the Planet (CFE), with reference UIDB/04004/2020, financed by FCT/MCTES through national funds (PIDDAC) and by TERRA Associate Laboratory (LA/P/0092/2020).

11. Type of submission: Abstract

S. Sectoral Working Group sessions: S8d – UNESCO Biosphere Reserves as key areas for new insights into Ecosystem Services assessment, valuation and management

Title: Assessing ecosystem services as a strategy for sustainable development and adaptation to climate change in vulnerable territories: a pilot study in the Northeast of Portugal

Presenting author: Joana Alves



Other authors: Joana Alves, António Alves da Silva, Miguel Moreira, Luciana Frazão, José Paulo Sousa, Helena Freitas

Affiliation: Centre for Functional Ecology – Science for People and the Planet (CFE), TERRA Associate Laboratory, Department of Life Sciences, University of Coimbra, Portugal

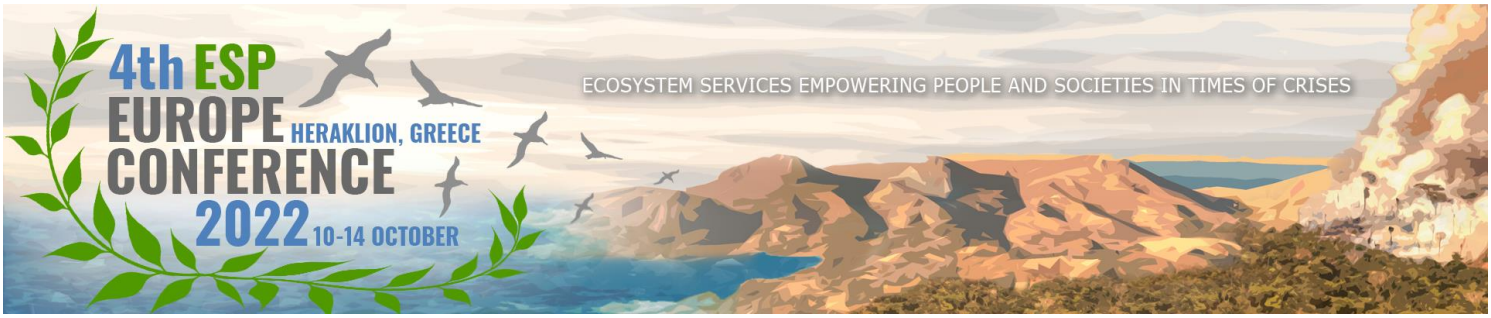
Humanity is heavily dependent on the efficient functioning of ecosystems, biodiversity, and the contributions that nature makes available to humankind, which are the basis for a constant flow of ecosystem services (ES), allowing the sustainability of territories, especially the ones more vulnerable to abandonment, wildfires, and climate change. It is now clear that ES are important for the long-term health of communities and the resilience of regions. This can only be done with a correct assessment of ecosystems and the services they provide.

The present work resulted from an initiative of the Directorate-General of Territorial Development (DGT), called "Landscape Reorganization and Management Program", that aims to plan and program the landscape transformation of vulnerable forest territories, aiming at a multifunctional and resilient landscape, new economic activities, and the remuneration of ecosystem services.

To foster the region's sustainable management, as well as to improve wildfire mitigation impacts due to its high vulnerability, we designed an ES assessment strategy under the IPBES's "Nature's Contributions to People" (NCP) methodological approach. The actual state of the ecosystems' condition was assessed based on a set of account indicators, including biophysical variables, protected areas analysis, and wildfire propensity. The assessment of the ES provision potential of each of the identified ecosystem types followed a matrix approach, based on the analysis of specific indicators (MAES Tier 2) and validated by experts, combined with the current condition of ecosystems. Afterwards, considering land-cover changes needed to improve the territory's sustainability and the adaptation to a future climate scenario, the condition status was recalculated, and the ES provision was modelled for the new land-cover scenario. Overall, the general supply of ES was improved, particularly for regulation services, confirming that ES provision can be improved when sustainable land management actions are adopted, thus enhancing the importance of the condition of ecosystems.

Keywords: Vulnerable territories, Landscape transformation, Ecosystem condition, Ecosystem services mapping

Acknowledgements:



This work was supported by the R&D Unit Centre for Functional Ecology - Science for People and the Planet (CFE), with reference UIDB/04004/2020, financed by FCT/MCTES through national funds (PIDDAC) and by TERRA Associate Laboratory (LA/P/0092/2020).

12. Type of submission: Abstract

S. Sectoral Working Group sessions: S8d - UNESCO Biosphere Reserves as key areas for new insights into Ecosystem Services assessment, valuation and management

Provision of soil ecosystem services by red deer. Lousã mountain as a study case

Presenting author: Joana Alves

Other authors: Garcia, Fernanda; Alves da Silva, António; Sousa, J. Paulo & Alves, Joana

Affiliation: Centre for Functional Ecology (CFE), TERRA Associate Laboratory, Department of Life Sciences, University of Coimbra, Portugal

Email: fernandagarcia377@gmail.com

In natural ecosystems, soils have several functions, as physical support, nutrient, and water supplies, or even habitat for soil organisms. They also have the capacity to regulate the hydrologic cycle, controlling the quality and quantity of water or acting as a regulator of the climate. Despite their importance for the numerous ecosystem services they provide, as well as their role in agricultural sustainability and even the global functioning of ecosystems, studies relating big animals to soils have been overlooked, particularly the effects of trampling by large mammals in Mediterranean ecosystems.

Ungulates, and more specifically, red deer, usually cause changes in soil physical properties through trampling, because of a combination of several features such as flexibility, shape, and pressure of hooves, the frequency of the impact or total footprint pressure. Besides the morphological features, their effects can also be a reflection of their activity patterns and habitat use. Thus, it is likely that red deer will have a considerable influence at the soil level. Our aim was to evaluate the role of red deer in the physical properties of the soil, namely by

measuring penetration resistance, water infiltration, and proportion of soil aggregates along a gradient of deer density.

Results showed that red deer do have an effect at the soil level, but not enough to be harmful or to damage soil health. Their effects can benefit nutrient and water input in soils. Considering the role of ungulates as ecosystem service providers, studies that relate their populations to the ecosystems where they are present are essential to predict their impact on the provision of ecosystem services.

Keywords: Red deer, soil physical properties, soil penetration, water infiltration, aggregate stability

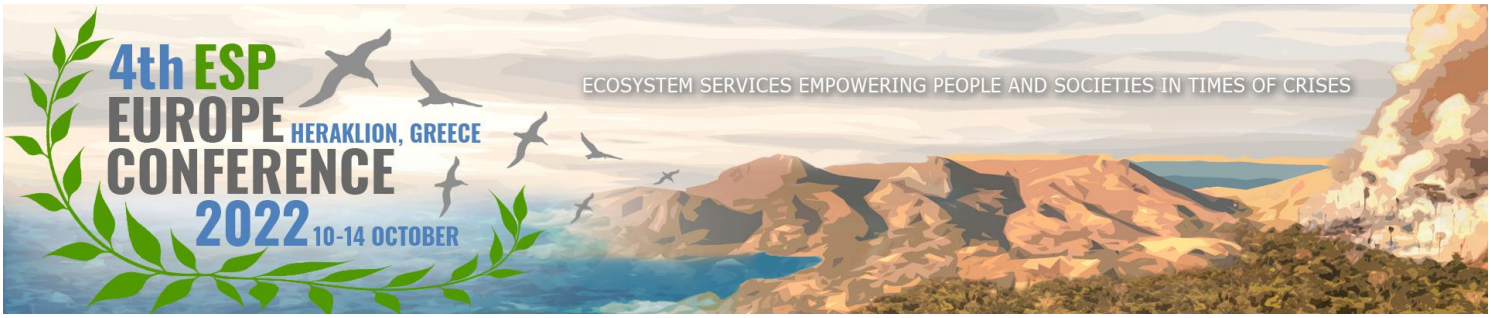
Acknowledgments:

This work was funded by the Portuguese Foundation for Science and Technology (FCT) by the fellowship of F. Garcia (SFRH/BD/131627/2017) and carried out under the project "F4F – Forest for Future – Pilot project for the constitution of a regional network for the valorisation of the forest sector in the Central Region PP6 – MyFORESt (CENTRO-08-5864-FSE-000031)", co-financed by the Regional Operational Programme Centro 2020, Portugal 2020, and the European Union, through the European Social Fund (ESF). The work was also supported by the R&D Unit Centre for Functional Ecology – Science for People and the Planet (CFE), with reference UIDB/04004/2020, financed by FCT/MCTES through national funds (PIDDAC) and by TERRA Associate Laboratory (LA/P/0092/2020).

13. Type of submission: Abstract

S. Sectoral Working Group sessions: S8d – UNESCO Biosphere Reserves as key areas for new insights into Ecosystem Services assessment, valuation and management

Participatory mapping as a management approach for the spatialization of key-ecosystem services: the Portuguese Biosphere Reserves case-study



Presenting author: Miguel Moreira1

Other authors: Luciana Frazão1, Paula Castro1, António Gouveia1, Helena Freitas1, Joana Alves1

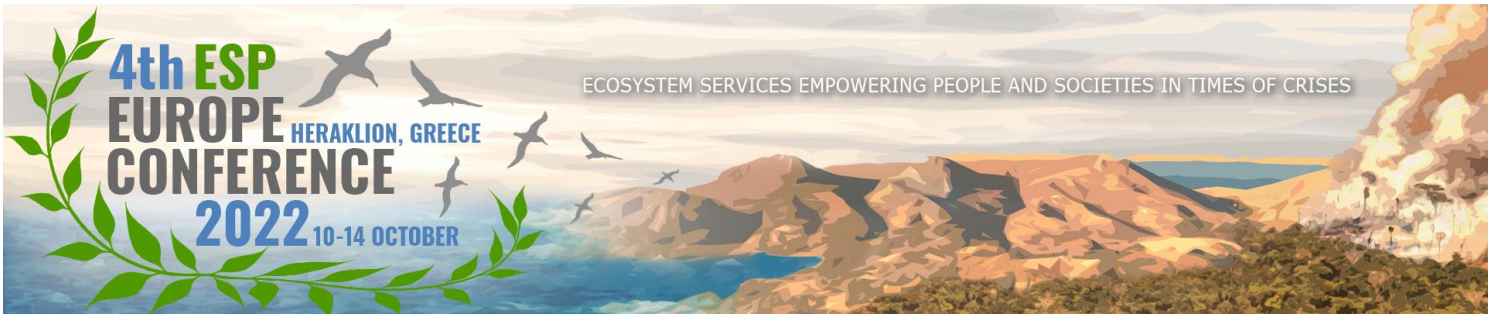
Affiliation: Centre for Functional Ecology - Science for People and the Planet (CFE), TERRA Associate Laboratory, Department of Life Sciences, University of Coimbra, Portugal

Ecosystem services (ES) supply is dependent on land-use governance and management decisions, where stakeholders in a landscape can be both beneficiaries and/or co-producers of ES. Participatory methodologies are crucial for linking territory needs to the sustainability of ES supply. In this sense, public participation geographical information system (PPGIS) approaches seek to understand the location of specific nature values and human perceptions and preferences for future land use and development. Promoting the use of GIS technologies to engage the public and stakeholders into participatory planning constitutes a strategic goal for decision-making. In this study, we developed an innovative participatory approach in the Portuguese Biosphere Reserves (BRs), following IPBES's "Nature's Contributions to People" (NCP) approach. RBs, being places for achieving the UN Sustainable Development Goals, involve local communities and all interested stakeholders in planning and management. Hence, the linkage between the spatialization of ES based on stakeholders' perception and BR territories' governance is a powerful tool to enhance its sustainable management.

Local participatory mapping was developed at each BR in Portugal, where a group of selected stakeholders were asked to map the key NCPs of their BR territory. The spatial distribution of NCPs in BRs was afterwards assessed using PPGIS tools, yielding a set of results: (a) how those NCPs vary according to each BR zonation and ecosystem type; (b) identifying hotspots of NCPs and spatial bundles of NCPs; and (c) assessing the social-economic characteristics that determined the distribution of those NCPs by the attendees. Therefore, conservation actions and land management strategies can be derived, regarding the local actors as fundamental players in the territory's sustainable management. As well, BRs were regarded as sites for testing interdisciplinary approaches to the understanding and managing interactions between social and ecological systems, defining priority areas through the geolocation of the key-ES in a multi-actor-based approach.

Keywords:Ecosystem services governance, PPGIS, Stakeholders, Biosphere Reserves, Nature's contributions to people

Acknowledgements: This work was carried out under the project "09_Call#3: Biosphere Reserves: Sustainable Territories, Resilient Communities" (grant number PT-ENVIRONMENT-0032), funded by EEA Grants, and supported by the R&D Unit Centre for Functional Ecology -



Science for People and the Planet (CFE), with reference UIDB/04004/2020, financed by FCT/MCTES through national funds (PIDDAC) and by TERRA Associate Laboratory (LA/P/0092/2020).

14. Type of submission: Abstract

S. Sectoral Working Group sessions: S8d - UNESCO Biosphere Reserves as key areas for new insights into Ecosystem Services assessment, valuation and management

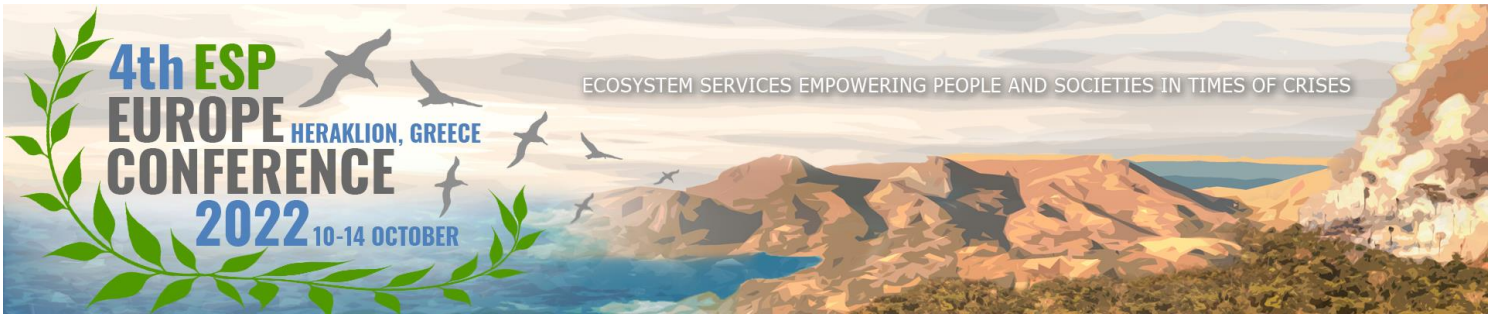
People's perception on ecosystem services and its role as a tool for sustainable management of Portuguese Biosphere Reserves: a participatory approach

Presenting author: Luciana Frazão*

Other authors: Luciana Frazão, Miguel Moreira, Paula Castro, Maria João Martins, Anabela Paula, António Gouveia, Helena Freitas, Joana Alves.

Affiliation: Centre for Functional Ecology - Science for People & the Planet (CFE), TERRA Associate Laboratory, Department of Life Sciences, University of Coimbra, Portugal. *Corresponding author: luca.frazao@uc.pt

Defined as the benefits humans derive from nature, the concept of ecosystem services (ES) clarifies how ecosystems contribute to human well-being. Despite its importance, the idea of ES is hardly implemented in decision-making processes, especially when it is not explicitly treated with its individualities in different areas of intervention. A participatory approach with stakeholders is an essential tool to address the interests of different ES actors and thus help develop the mechanism for the management, conservation, sustainable use, and valuation of ES. Biosphere reserves (BRs) were initially conceived by UNESCO as an international network of nature conservation areas that would "lead through/by example" (by) reconciling the protection of nature with human development. In this sense, the BRs have a crucial role in achieving the UN Sustainable Development Goals, based on three guiding principles: conserving biodiversity, restoring, and enhancing ecosystem services, and promoting the sustainable use of natural resources. Based on participatory methodologies and with a holistic assessment encompassing the different ES's ecological, economic, and social perspectives, we identified the key ES provided by the Portuguese RBs. To achieve this objective, we use a standardized and transdisciplinary approach to integrate stakeholders into the ES assessment conducted in workshops in each BRs in Portugal and then explore the ES based on stakeholders' perceptions. The three key ES identified by the stakeholders and grouped into Nature Contributions to People (NCPs) were Habitat and Conservation, Food and Feed, and



Water quantity and flow regulation. Our results are the first step toward putting the concept of ecosystem services (ES) into conservation planning and policy in Portuguese BRs, based on the direct participation of stakeholders and making BRs better examples of how to reach the UN Sustainable Development Goals.

Keywords: Biodiversity, Conservation, Participatory methodology, Local knowledge, Sustainability.

Acknowledgements:This work was carried out under the project "09_Call#3: Biosphere Reserves: Sustainable Territories, Resilient Communities" (grant number PT-ENVIRONMENT-0032), funded by EEA Grants, and supported by the R&D Unit Centre for Functional Ecology - Science for People and the Planet (CFE), with reference UIDB/04004/2020, financed by FCT/MCTES through national funds (PIDDAC) and by TERRA Associate Laboratory (LA/P/0092/2020).